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Monday, 1 May 2023

Integrated System Plan Team  
Australian Energy Market Operator

Lodged via email: [ISP@aemo.com.au](mailto:ISP@aemo.com.au)

Dear Sir/Madam,

### **2023 ISP Methodology Consultation**

Transgrid welcomes the opportunity to respond to the *Update to the ISP Methodology* consultation paper published by the Australian Energy Market Operator (AEMO) on 31 March 2023.

Transgrid operates and manages the high voltage electricity transmission network in NSW and the ACT, connecting generators, distributors and major end users. We have an important role in managing one of the key parts of the Australian energy system as it transitions to a higher renewables penetration. We remain committed to playing our part in delivering the major transmission investments identified in the Integrated System Plan (ISP) to provide significant benefits to consumers.

Transgrid considers that there is significant value in the trusted, comprehensive and detailed nature of AEMO's ISP. We broadly support the proposed updates to the ISP Methodology.

Our specific feedback to the consultation is limited to the following matters:

- The need to consider 'N-1 Secure' in transmission planning frameworks.
- Transmission project lead time uncertainty.
- Potential inclusion of a value of carbon emissions.
- Finalising the Optimal Development Path (ODP) with reference to consumer risk preferences.
- Impact of fossil-fuelled generation on renewable energy zone (REZ) transmission limits.
- Network losses for REZs and sub-regions.
- Aligning assumed renewable energy resource quality in REZs with historical performance.
- Better reflecting expected energy reservation practices in the dispatch behaviour of storage devices.
- Incorporating a more realistic representation of the duration of demand-side participation (DSP) response.

Each of these matters is discussed below.

*The need to consider 'N-1 Secure' in transmission planning frameworks.*

Transgrid encourages AEMO to consider whether alternate planning standards, potentially incorporated into the ISP Methodology's engineering assessment stage, could improve the resilience of key parts of the power system. This is important given significant amounts of geographically concentrated retiring fossil fuel generation will be replaced by variable renewable energy capacity in multiple REZs, such as is the case for the Sydney-Newcastle-Wollongong (SNW) load centre.

Within the planning process, the terms *System Normal* and *N-1* are used to describe the system in the pre and post outage state respectively. Under current frameworks the transmission network is planned through N-1 studies to ensure that it can be operated by AEMO in a *satisfactory operating state*.<sup>1</sup> During N-1 conditions in real time operations, AEMO seek to operate within a *secure operating state*.<sup>2</sup>

The difference between the planned *satisfactory operating state* and the subsequent N-1 *secure operating state* (or N-1 Secure) sought by AEMO in real time operations may result in additional actions by AEMO such as load shedding and/or redispatch of generation. This difference could be mitigated if the transmission network was planned to an N-1 Secure planning standard.

This could be a prudent change to consider if applied specifically to high value load centres, such as SNW, which are exposed to higher risks of load shedding with:

- The retirement of geographically concentrated fossil fuel generation over the next 10 years.
- A changing climate with increasing severity and frequency of extreme weather events increases challenges to managing a reliable system.

*Transmission project lead time uncertainty.*

Transgrid supports AEMO's efforts to better recognise the risks associated with transmission project delivery in the ISP framework. Transgrid is working to accelerate our own major transmission projects through the Powering Tomorrow Together (PTT) program which bundles procurement and reduces supply chain delay risks for HumeLink, VNI West and Project EnergyConnect.

Under the current methodology, if the optimal timing of a transmission project under an ODP aligns with the project's expected in-service date (EISD) (or at least is within EISD + 1 year), the project can be identified as an actionable ISP project. AEMO has identified two options for incorporating this uncertainty into the Draft ISP Methodology, and ultimately into the ISP, although only one is recommended by AEMO:

- Introduce an 'actionable window' that extends the time beyond the EISD under which a project could be considered beneficial and identified as an actionable ISP project.
- Revise the EISDs to reflect observed project delay factors. Under this option recommended by AEMO, AEMO would review and possibly extend the proposed project lead times from project proponents to acknowledge and incorporate the greater uncertainty observed in delivery of these major infrastructure projects.

Transgrid considers that the option of introducing an 'actionable window' is a simple solution that may prudently allow some projects to be identified as actionable sooner, helping to address project lead time uncertainty.

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<sup>1</sup> A satisfactory operating state is when the power system is operating within all applicable limits and operating standards, and is stable.

<sup>2</sup> A *secure operating state* describes a state which is satisfactory both now and following 'the next credible contingency'.

AEMO's preferred option, to revise project EISDs to reflect observed delay factors, may help incorporate project lead time uncertainty into the ISP methodology. However, we would not support this option if it gave AEMO the ability to amend project EISDs without agreement from the respective transmission network service provider and recognition of efforts, such as our PTT program, to reduce specific project delay risk factors. Transgrid will continue to engage with AEMO on individual project EISDs through its Transmission Expansion Options Report.

*Potential inclusion of a value of carbon emissions.*

Transgrid supports AEMO building in the flexibility in the ISP methodology to respond to proposed changes to the national energy objectives to include an emissions reduction objective. This is a proactive change that builds in the ability for the ISP methodology to incorporate the possibility of the use of a value of carbon emissions.

This update will also facilitate AEMO smoothly taking on the responsibility of developing a value of carbon emissions for use across market body decision making if Energy Minister's decide AEMO is the appropriate party to be given this responsibility. Whichever party is chosen to carry out this work should develop and regularly update guidance on carbon pricing in a consultative manner with a clear methodology aligned with international best practice.

*Finalising the Optimal Development Path (ODP) with reference to consumer risk preferences.*

Transgrid supports AEMO's efforts to improve the quantification of consumer risk preferences used to inform the selection of the optimal development pathway. It is important to further efforts to mitigate risks of project timeline slippage given the potential for significant cost increases to consumer bills from delays of transmission delivery throughout the transition.

Given this, Transgrid supports inclusion of an evidenced based consumer risk preference metric to mitigate risks to project timeline slippage as part of applying professional judgement to finalise the selection of the ODP.

*Impact of fossil-fuelled generation on renewable energy zone (REZ) transmission limits.*

Transgrid supports AEMO's proposed update to allow fossil-fuelled generators and nearby flow paths to be considered specifically in the formulation of each REZ transmission limit. We consider that this will allow for a more accurate representation of the opportunities and ideal location for renewables and network augmentations.

It may be valuable for AEMO to consider whether other variables could be added to the REZ transmission limit to further improve the representation of the network. This could include consideration of including storage, hydrogen electrolyzers or other large loads as variables in certain REZ transmission limits where appropriate.

*Network losses for REZ and sub-regions.*

Transgrid supports the proposed update to create new sub-regions and associated sub-regional loss equations and considers it will provide an improved representation of network conditions. This update will allow the ISP to dynamically take changing losses into account when determining optimal placement of new generation. We consider this change will better reflect actual developer locational decision making for new renewable generation projects.

*Aligning assumed renewable energy resource quality in REZs with historical performance.*

Transgrid supports AEMO's proposed update to enhance the ISP assessment of wind resource quality. Transgrid agrees that more accurate generation profiles can be modelled for REZs if more granular information about sites which are unsuitable for development are incorporated into the REZ resource limit and quality assessment process.

Transgrid encourages AEMO to stress test its proposed approach and results for each REZ with the levels of developer interest. For example, there is a clear mismatch in the South West REZ with a higher level of developer interest than indicated by the 2023 draft IASR which includes build limits for wind of 3.9GW and for solar of 2.256GW.

*Better reflecting expected energy reservation practices in the dispatch behaviour of storage devices.*

Transgrid supports AEMO's efforts to reflect the dynamic operational behaviours of storage more accurately within the ISP. Moving away from the simplistic assumption of storage having perfect foresight in dispatch timeframes and being fully available to the energy market will allow for a more accurate estimate of future short, medium, and long duration storage needs across the NEM.

Transgrid agrees with AEMO's view that storage devices (short-duration in particular) are not and will not be operated exclusively to meet power system needs at the precise time they are most required. Transgrid supports AEMO's proposal to reflect this in its modelling assumptions by preventing individual or aggregated storage projects from discharging their full energy capacity within a single day or given period. Transgrid considers AEMO's proposed derating factors, of up to 50% depending on the duration of the storage project, are appropriate given they reflect observations of historical storage behaviour. Transgrid will continue to provide specific feedback on this proposal through AEMO's Forecasting Reference Group consultation process over Q2 2023.

To complement this proposed update, Transgrid encourages AEMO to consider further updates to the ISP methodology to provide greater transparency on where short, medium and long duration storage technologies are located across NEM regions and sub-regions. More granular information on where the ISP optimally plants storage of varying durations would assist in better understanding the needs of a high penetration variable renewable energy system.

*Incorporating a more realistic representation of the duration of demand-side participation (DSP) response.*

Transgrid supports a change to limit the ISP modelling representation of daily energy contribution from the reliability-response band of DSP to a maximum of two hours of continuous operation. Transgrid does not support continuing to assume DSP will continuously be activated for many hours or days during periods of peak demand or low generation reserves.

This change ensures that DSP in the ISP is reflective of historical observations and realistic future expectations which will improve the accuracy of the resulting ODP. It will also materially improve the network, generation and storage needs forecasted by the ISP given the model cannot rely on DSP in modelled unserved energy events for unrealistically long durations.

### **Next steps**

We will continue to work collaboratively with AEMO as it develops this report and other key elements of the 2024 ISP. If you require any further information or clarification on this submission, please feel free to contact me or Kasia Kulbacka at [kasia.kulbacka@transgrid.com.au](mailto:kasia.kulbacka@transgrid.com.au).

Yours faithfully



Marie Jordan  
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